

## No. 6

$$M = 32 \text{ kg/kmol}$$

$$C_v = 0.65 \text{ kJ/kg K}$$

$$R = 8.3145/M = 0.259828125$$

$$C_p - C_v = R$$

$$C_p = 0.90983 \text{ kJ/kg K}$$

$$\gamma = 1.4$$

$$V_1 = 0.03 \text{ m}^3$$

$$P_1 = 16 \text{ bar}$$

**From 1 to 2 Adiabatic**

$$P_2 = 4.5 \text{ bar}$$

$$T_2 = 302 \text{ K}$$

**From 2 to 3 P = Const.**

$$P_3 = 4.5 \text{ bar}$$

$$T_3 = T_1$$

**From 3 to 1 Isothermal**

$$P_1 V_1^\gamma = P_2 V_2^\gamma$$

$$V_2 = 0.074 \text{ m}^3$$

$$v_2 = RT_2/P_2 = 0.174 \text{ m}^3/\text{kg}$$

$$v_1 = v_1/\text{mass}$$

$$\text{mass} = 0.426 \text{ kg}$$

$$v_1 = 0.0705 \text{ m}^3/\text{kg}$$

$$T_1 = P_1 v_1 / R = 433.92 \text{ K}$$

$$U_1 = m C_v T_1 = 120.08 \text{ kJ/kg}$$

$$H_1 = m C_p T_1 = 168.08 \text{ kJ/kg}$$

$$U_2 = m C_v T_2 = 83.57 \text{ kJ/kg}$$

$$H_2 = m C_p T_2 = 117 \text{ kJ/kg}$$

$$v_3 = RT_3/P_3 = 0.25 \text{ m}^3/\text{kg}$$

$$U_3 = 120.08 \text{ kJ/kg}$$

$$H_3 = 168.08 \text{ kJ/kg}$$

$$Q_{1-2} = 0$$

$$W_{1-2} = U_1 - U_2 = 36.51 \text{ kJ/kg}$$

$$Q_{2-3} = m C_p (T_3 - T_2) = 51.1 \text{ kJ/kg}$$

$$W_{2-3} = p(V_3 - V_2) = 34.276 \text{ kJ/kg}$$

$$W_{3-1} = Q_{3-1} = m R T \ln(v_1/v_3) = -60.9 \text{ kJ/kg}$$

